REMARKS

Claims 32-44 currently appear in this application. The Office Action of June 26, 2003, has been carefully studied. These claims define novel and unobvious subject matter under Sections 102 and 103 of 35 U.S.C., and therefore should be allowed. Applicant respectfully requests favorable reconsideration, entry of the present amendment, and formal allowance of the claims.

Rejections under 35 U.S.C. 112

Claims 32 and 41 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The Examiner alleges that the limitation "either concurrently or successively" is not found in the disclosure.

This rejection is respectfully traversed. The claims have been written to claim oxidant, predominantly anion-containing solution and reductant, predominantly cation-containing solution.

In the present invention, because of the nature of the electrochemical cell reactor used in the present invention, the hydraulic flow path mixes some catholyte back into the anodic chamber, or some anolyte backs into the cathodic chamber. Because of the prevailing hydraulic regimes and the semi-permeable membrane, some degree of back-mixing

occurs in both of the bulk streams, as well as of the individual ionic species, creating solutions of a mixed nature. However, because the amount of back-mixing is limited, each solution retains its predominantly anodic or cathodic characteristics.

That is, both types of anionic and cationic species would be found in each stream, but in different degrees of prevalence. It is important to bear in mind that the catholyte is a negatively charged fluid stream, although it contains positively charged cations such as Na+ and Ca2+, while the anolyte is a positively charged fluid stream, although it contains negatively charged ions such as Cl-. Hence, both anolyte and catholyte contain both anions and cations, but to different degrees of prevalence. Also, it is because of the predominance of anions or cations that the anolyte and catholyte have their oxidant and reductant characteristics.

Claims 32 and 41 are rejected under 35 U.S.C. 112. second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner states that the meaning of a limitation, "treating a container with at least one of said solutions, either concurrently or successively," is not understood.

This rejection is respectfully traversed. Claims 32 and 41 have been amended to recite that the container is treated with both solutions. The present invention specifically provides for the independent production, harvesting and use of a predominately cation-containing stream and a separate, predominantly anion-containing stream, wherein the two product streams (one product stream is a cation-rich stream, and the other product stream is an anion-rich stream) are produced and harvested separately and then independently applied, either simultaneously or consecutively.

The present inventor has discovered that there is a vast difference in characteristics and efficacy of an electrochemically-activated saline solution if the predominant radical cation-containing solution and the predominant radical anion-solution are produced, harvested and applied as two separate product stream, as compared to their effect when they are produced, harvested, and applied as a single stream or solution comprising both cation-and anion-containing solutions in a single pre-mixed solution. Accordingly, the claims have been amended to recite, "independently treating a container with the separate oxidant, predominantly anion-containing solution and the separate reductant, predominantly cation-containing solution.

The present invention requires treating the container with both the anolyte and the catholyte solution, but these solutions are applied separately. This can be done in one of two possible ways: one of which is to treat the container first with the one solution and then with the other solution, or alternatively simultaneously to treat the container with the two separate solution, but to do so while the solutions are still separate. The solutions are not pre-mixed prior to application, but are applied in their separate states. The anolyte and catholyte solutions produced are meta-stable solutions that have increased activity for a limited period of time. The present invention takes advantage of this period of increased activity to apply the two solutions and does so while the solutions are in their separate state. In fact, because there is a limited period of time in which the solutions have increased activity, the solutions are generated on site. If the solutions are mixed before they are applied, as suggested by Doi, they "cancel out" each other's heightened activities to a large degree, resulting in a mixed solution, *i.e.*, comprising both the anolyte and catholyte together in one solution, of far lesser efficacy. Claims 32 and 41 have now been amended to more clearly define this aspect of the invention.

Art Rejections

Claims 32-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doi in view of Bakhir et al.

This rejection is respectfully traversed. It is true that Doi discloses an electrolytic cell with a diaphragm between the anode and cathode that is adapted to separate an anodic and a cathodic chamber, and that such a cell would be capable of producing two separate solutions, namely, a catholyte and an anolyte solution. However, what Doi describes in the background to and description of the invention is the known method of pre-dividing a feed solution into two streams, sending one stream through the anodic chamber and the other stream through the cathodic chamber, and then harvesting two separate solutions. Doi does not disclose or suggest (1) sending the **entire** feed solution through one electrode chamber (either anodic chamber or cathodic chamber), and thereafter (2) recirculating all or part of the electrolyzed solution thorough the other electrode chamber (cathodic or anodic chamber, as the case may be). It is because of the preparation arrangement that the applicant is able to modulate the respective characteristics of the anolyte and catholyte, such as pH and ORP, which are produced by the method of the present invention.

By way of example, the present inventor typically introduces a dilute saline feed solution into the cathodic chamber to produce an electrolyzed catholyte. All or part of the catholyte is then introduced into the anodic chamber to produce an anolyte solution. Depending on the characteristics required, part or all of the anolyte and/or catholyte solutions could be again reintroduced into the cathodic and/or anodic chambers of the same or subsequent reactors. From this example, it follows that the present invention permits a vast number of circulation and recirculation sequences so as to manipulate the properties of the respective anolyte and catholyte being produced. This feature is neither disclosed nor suggested by Doi. The present invention then uses these modified solutions in the treatment of food storage containers. This is the first primary difference between Doi and the present application.

Doi teaches adding one solution to another such that the mixed solution is applied concurrently. However, this is in fact a disadvantage of Doi, because if the solutions are mixed prior to application, they cancel out each other's heightened activity which results from their electrolytic preparation.

Bakhir et al. add nothing to Doi to arrive at the presently claimed invention. The Bakhir et al. patents each

describe an electrolytic cell that is similar to the cell used in the present application, although neither Bakhir et al. patent describes the particular application of the electrolytic cell as described in the present application. The electrolytic cell described in Bakhir et al. can be analogized to a microchip for a computer: the microchip by itself is not functional, and requires a keyboard, screen, mouse, peripherals, and, most importantly, software to reach its full potential. Similarly, although the electrolytic cell used in the present application is similar to the electrolytic cell described in Bakhir et al., the peripherals, *e.g.*, the controls, hydraulic and electrical components, overall system design, and flow regimes, of the present application are very different from those of Bakhir et al. There is no suggestion in Bakhir of the possibility of applying the electrolytic cell disclosed therein for treating bulk food storage containers, and there is nothing in Bakhir that teaches any particular system design or application parameters for such application. The novelty and unobviousness of the present invention does not reside in the electrolytic cell *per se*, but in the application of this particular electrolytic cell in terms of the specific operating parameters, particularly for obtaining metastable activated solutions, which make the cell particularly useful for treating bulk food storage containers.

It is respectfully submitted that, at the time of filing his own application, Doi must have had the benefit of Bakhir's earlier disclosures. If it had been obvious to use Bakhir et al. in those applications, including treatment of food storage containers, disclosed by Doi, why did Doi produce his solutions in eth particular batch-driven electrolysis device that he used? There is no reason one skilled in the art would combine Bakhir et al. with Doi. Even, *argumento*, had Bakhir's device been combined with Doi, there would still be no suggestion to apply the solutions separately so that they did not cancel out each other's heightened activity.

With respect to claim 33, the difference between Doi and the present invention is that the present invention produces ice from **either** one of the anolyte or catholyte, which solutions are in a heightened state of activity. There is nothing in any of the cited references that suggests this method of producing ice.

The food industry covers a very wide range of physical, chemical and biological properties and characteristics. What is applicable in grain milling may be totally inappropriate in dairy processing; what might work very well in treating and packaging sauces and condiments may be entirely detrimental to treating fresh produce. Also, in many applications, abattoirs may require different conditions

form those of a bakery. The food industry is not a homogeneous singular entity. It is therefore submitted that Doi's claim that his solution is suitable for use in the "food industry, medical products, and the like" is speculative, vague, and unsound.

The present invention enables one to produce ice consisting exclusively of anolyte, or of catholyte, or of a mixture of anolyte and catholyte, mixed in any preferred ratio after separate production and harvesting before freezing, depending upon the specific requirements of the specific application. Doi, who merely freezes and electrolytically activated solution comprising both anolyte and catholyte in one solution, does not anticipate or render obvious the possibility of "two types of ice."

Furthermore, there is nothing in Doi that even suggest the possibility of "modulating the respective properties of the predominantly anion-containing solution and the predominantly cation-containing solution by separate and independent recirculation of either one or both of the solutions though a same electrode chamber or a counter-electrode chamber, as recited in claim 32, and then subsequently producing two types of ice, one being of the predominantly anion-containing solution and the other being of the predominantly cation-containing solution, wherein each of

these two types of ice can be modulated independently for different applications. So, for example, certain types of fruits and vegetables can be packed in two different types of ice, *i.e.*, "anolytic ice" and "catholytic ice", that have vastly different characteristics of the ice used for the fruits and vegetables. Claim 33 has been amended to more clearly define this feature of the invention.

With respect to claim 34, it is respectfully submitted that "small amount" is a relative term that is vague and speculative. The point of the present invention is to avoid producing a chlorine generator and, similarly to the science of homeopathic solutions, it is of paramount importance for optimal working of the present invention that all concentrations and amounts are controlled accurately in order to enable effective use of such solutions in different applications. If an increased amount of salt were added to the feed solution, say, for example, 15%, this amount could very well be argued to be a "small amount" as well. But this salt concentration would result in the production of excessive amounts of chlorine, which in turn will affect the taste of foodstuffs and which is exactly what the present inventor has tried to avoid. Through his research, the present invention has found an optimal balance between efficacy and the unwanted presence of chlorine at a salt concentration in the feed

solution of 3% to 10%. Moreover, claim 34 depends from claim 32, which is new and unobvious over the cited art.

While the Examiner's arguments are correct regarding claims 35-39, it must be appreciated that these claims all depend ultimately from claim 32 and include all of the limitations thereof. Since claim 32 is not rendered obvious by the combination of Doi and Bakhir et al., claims 35-39 are also not obvious in view of Doi and Bakhir et al.

With respect to claim 40, Doi's statement about using the activated solution in foodstuffs is speculative and vague, as different types of foodstuffs require different types of treatment. Even if Doi's solution could be applied to various fields and specifically to food facilities, it must be appreciated that Doi does not separate the anolyte from the catholyte, but rather combines the two solutions, thus canceling our the activated energy which is possessed for a short time by each solution.

In view of the above, it is respectfully submitted that the claims are now in condition for allowance, and favorable action thereon is earnestly solicited.

Respectfully submitted,

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